

# PATENT ABSTRACTS OF JAPAN

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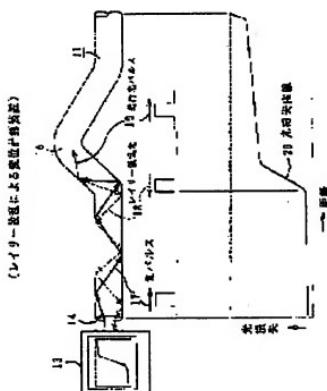
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## (54) DISPLACEMENT MEASURING APPARATUS USING RAYLEIGH SCATTERING



### (57)Abstract:

PROBLEM TO BE SOLVED: To provide an apparatus for continuously and safely measuring the displacement of a civil engineering structure by use of Rayleigh scattering occurring in an optical fiber, while amplifying microscopic displacements.

SOLUTION: The apparatus detects the displacement of the civil engineering structure 12 from changes in the backscattered light of a light pulse input to the optical fiber 11. The optical fiber 11 is fixedly connected to the displacement amplifying rod 23 of a displacement amplifying means 21 provided in a displacement detecting part. When it is assumed that a crack 29 occurs in the civil engineering structure 12 and the structure 12 is displaced by  $x$ , the distance over which the fiber supporting point 27 of the displacement amplifying means 21 is displaced is amplified

for detection. When the optical fiber 11 is pulled by the displacement amplifying rod 23, it is curved at an acute angle and the amount of backscattered light decreases sharply. This is measured by an optical time domain reflection measuring instrument 13. The distance to the place of occurrence of the crack 29 is determined from light reception time and the velocity of light within the optical fiber 11.

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